CLAIMS

1. A radiation field detection system for use with a radiating device, the detection system comprising:

a radiation detector configured to receive radiation and to provide radiation strength indicia of amounts of radiation received;

a positioning mechanism connected to the radiation detector and configured to physically move the radiation detector; and

a processor coupled to the positioning mechanism and coupled to the radiation detector to receive the radiation strength indicia, the processor being configured to:

actuate the positioning mechanism to move the radiation detector to desired locations within a radiation field produced by the radiating device;

analyze the radiation strength indicia from the radiation detector;

correlate positions of the radiation detector with corresponding amounts of received radiation;

determine a first location of maximum detected radiation; and

determine a first relationship between the first location of maximum detected radiation and a second location of maximum radiation.

2. The detection system of claim 1 further comprising an output port configured to be coupled to a controller that determines an excitation arrangement for the radiating device, wherein the processor is further configured to provide an indication of the first relationship to the output port for conveyance to the controller.

3. The detection system of claim 2 wherein the second location of maximum radiation is one of (1) an expected location of maximum radiation and (2) a determined location of maximum radiation detected under a second radiation condition that is different than a first radiation condition in effect when the radiation was detected leading to the determination of the first location.

4. The detection system of claim 3 wherein the second radiation condition is a different angle of application of radiation by the radiating device, with the radiating device being a linear accelerator.

5. The detection system of claim 1 wherein the processor is further configured to determine a first magnitude of maximum detected radiation and to determine a second relationship between the first magnitude of maximum detected radiation and a second magnitude of maximum radiation.

6. The detection system of claim 5 further comprising an output port configured to be coupled to a controller that determines an excitation arrangement for the radiating device, wherein the processor is further configured to provide an indication of the magnitude relation to the output port for conveyance to the controller.

7. The detection system of claim 6 wherein the second magnitude of maximum radiation is one of (1) an expected magnitude of maximum radiation and (2) a determined magnitude of maximum radiation detected under a second radiation condition that is different than a first radiation condition in effect when the radiation was detected leading to the determination of the first location.

8. The detection system of claim 7 wherein the second radiation condition is a different angle of application of radiation by the radiating device, with the radiating device being a linear accelerator.

9. The detection system of claim 1 wherein the radiation detector is an ionization chamber.

10. The detection system of claim 9 wherein the radiation detector is a silicon diode detector that has a detection volume of less than about $0.2mm^3$.

11. The detection system of claim 1 wherein the positioning mechanism is configured to move the radiation detector three-dimensionally.

12. A radiation field detection system for use with a radiating device, the detection system comprising:

an ionization chamber radiation detector configured to receive radiation and to provide, in real time, radiation strength indicia of amounts of radiation received;

a positioning mechanism connected to the radiation detector and configured to physically move the radiation detector; and

a processor coupled to the positioning mechanism and coupled to the radiation detector to receive the radiation strength indicia, the processor being configured to:

actuate the positioning mechanism to move the radiation detector to a desired location within a radiation field produced by the radiating device;

analyze the radiation strength indicia from the radiation detector in real time;

correlate positions of the radiation detector with corresponding amounts of received radiation in real time; and

determine, in real time, a location of maximum detected radiation.

13. The detection system of claim 12 wherein the processor is configured to correlate the positions of the radiation detector with corresponding amounts of detected radiation as information regarding the positions and the corresponding amounts of radiation becomes available.

14. The detection system of claim 12 wherein the ionization chamber is a silicon diode ionization chamber that has a detection volume of less than about $0.2mm^3$.

15. The detection system of claim 12 further comprising an output port configured to be coupled to a controller that determines an excitation arrangement for the radiating device, wherein the processor is further configured to provide an indication of

the location of the maximum detected radiation to the output port for conveyance to the controller.

16. The detection system of claim 12 wherein the processor is configured to use the determined location of maximum detected radiation, knowledge of an excitation plan implemented by the radiating device, and an expected location of maximum radiation to determine a revised excitation plan to be implemented by the radiating device.

17. The detection system of claim 16 wherein the processor is configured to iterate the revised excitation plan to be implemented by the radiating device until the determined location of maximum detected radiation is within an acceptable distance from the expected location of maximum radiation.

18. The detection system of claim 12 wherein the processor is configured to actuate the positioning mechanism to initially move the radiation detector to at least one of: (1) a geometric central axis if the radiating device is a Gamma Knife, and (2) an expected maximum radiation location of a linear accelerator beam if the radiating device is a linear accelerator.

19. The detection system of claim 12 wherein the processor is configured to actuate the positioning mechanism to move the radiation detector based on a radiation strength previously detected by the radiation detector.

20. A computer-implemented method of using a radiating device, the method comprising using at least one processor to:

apply radiation from the radiating device in accordance with a first excitation plan;

actuate a positioning mechanism to move a radiation detector, configured to receive radiation and to provide radiation strength indicia of amounts of radiation

received, in three dimensions within a volume to provide information regarding radiation strength in the volume from the radiating device;

analyze the radiation strength indicia from the radiation detector;

correlate positions of the radiation detector with corresponding amounts of received radiation;

determine a first location of maximum detected radiation;

determine a first relationship between the first location of maximum detected radiation and a second location of maximum radiation; and

determine a second excitation plan based upon the first relationship.

21. The method of claim 20 further comprising using the at least one processor to iterate the second excitation plan until the first relationship satisfies at least one desired criterion.

22. The method of claim 20 wherein the at least one desired criterion includes that the first relationship indicates a positional variance between the first location and the second location that is less than a threshold variance.

23. The method of claim 20 wherein the second location of maximum radiation is one of (1) an expected location of maximum radiation and (2) a determined location of maximum radiation detected under a second radiation condition that is different than a first radiation condition in effect when the radiation was detected leading to the determination of the first location.

24. The method of claim 23 wherein the second radiation condition is a different angle of application of radiation by the radiating device, with the radiating device being a linear accelerator.

25. The method of claim 20 further comprising using the at least one processor to:

determine a first magnitude of maximum detected radiation; and

determine a second relationship between the first magnitude of maximum detected radiation and a second magnitude of maximum radiation.

26. The method of claim 25 wherein the second magnitude of maximum radiation is one of (1) an expected magnitude of maximum radiation and (2) a determined magnitude of maximum radiation detected under a second radiation condition that is different than a first radiation condition in effect when the radiation was detected leading to the determination of the first location.

27. The method of claim 26 wherein the second radiation condition is a different angle of application of radiation by the radiating device, with the radiating device being a linear accelerator.

28. A radiation field detection system for use with a radiating device, the detection system comprising:

a radiation detector configured to receive radiation and to provide radiation strength indicia of amounts of radiation received;

a positioning mechanism connected to the radiation detector and configured to physically move the radiation detector;

a processor coupled to the positioning mechanism and coupled to the radiation detector to receive the radiation strength indicia, the processor being configured to:

actuate the positioning mechanism to move the radiation detector to a desired location within a radiation field produced by the radiating device;

actuate the positioning mechanism to alter an orientation of the radiation detector relative to the radiating device while at the desired location;

analyze the radiation strength indicia from the radiation detector while in different orientations relative to the radiating device while at the desired location; and

determine a desired orientation of the radiation detector for the desired location such that artifacts are reduced.

29. The detection system of claim 28 wherein the processor is further configured to:

correlate positions of the radiation detector with corresponding radiation amounts; and

determine a location of the radiation detector corresponding to a highest amount of detected radiation.

30. The detection system of claim 28 wherein the processor is configured to actuate the positioning mechanism to initially orient the radiation detector to have a central axis of a radiation beam from the radiating device be substantially perpendicular to a stem of the radiation detector.

31. The radiation detector of claim 28 wherein the processor is configured to determine the desired position such that alteration of the orientation of the radiation detector in any direction results in a decrease in detected radiation.